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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Michael A. Johnson et al. Art Unit: 1301
Serial No.: 08/421,055 Examiner: Gallagher
Filed : April 12, 1995
Title : MELT-FLOWABLE MATERIALS AND METHOD OF SEALING SURFACES

Commissioner of Patents and Trademarks
Washington, DC 20231

APPEAL BRIEF

Applicants submit the following brief pursuant to the Notice of Appeal filed November 18, 1996. An appendix listing the claims on appeal, as well as a one month of extension of time, are also included.

I. Real Party in Interest

The real party in interest is Minnesota Mining and Manufacturing Co.

II. Related Appeals and Interferences

None.

III. Status of Claims

Claims 6-32 stand finally rejected.

IV. Status of Amendments

The amendments submitted subsequent to the final rejection have been entered.

V. Summary of the Invention

Applicants' invention relates to a method for modifying

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Judith A Pullo
Judith A Pullo

the surface of a substrate using an article that includes a "melt-flowable composition" and a "dimensionally stable film" for controlling the melt-flow properties of the composition. To understand the significance of the invention requires an understanding of the problem confronting the applicants when they made their discovery.

One of the applicants' objectives was to develop a sealing composition for us, e.g., in sealing automotive roof ditches that was effective, yet easy to use. Previously, PVC plastisol pastes had been used for this purpose. These plastisols were messy and highly user-dependent, often resulting in imperfect seals.

In order to prevent gaps that could lead to leaks, the applicants recognized that they needed a sealing composition that flowed when heated to wet the surface being sealed. However, they also recognized the importance of avoiding uncontrolled flow (a problem associated, e.g., with the PVC plastisols) to ensure that the composition only wet the designated area of the substrate. The inventors further recognized that at least in some instances, it would be desirable to control the shrinkage of the composition, preferably confining shrinkage primarily to the downweb direction. For example, in the case of roof ditch moldings, controlling shrinkage in this manner minimizes the formation of drips or balls of sealant in the end of the roof ditch (where tolerances are tight). Such drips or balls prevent the roof ditch from fitting properly, resulting in leakage.

Another problem confronting the inventors was the surface

that resulted following application of the sealing composition. Because material such as PVC plastisol readily and uncontrollably flowed, the resulting surface was often irregular and bumpy. This presented several problems. First, in the case where it was desired to bond, e.g., a decorative molding over the surface, the bumps led to gaps between the sealant surface and the molding, resulting in delamination. Second, in applications requiring a painted surface (e.g., where the surface was designed to be visible), the bumps caused the paint to crack and flake off.

The solution the applicants discovered was to combine a "melt-flowable composition" with a "dimensionally stable film." In order to appreciate applicants' invention, it is important to understand that not every backing material qualifies as a "dimensionally stable film," nor does every adhesive composition qualify as a "melt-flowable composition."

A "melt-flowable composition" is a composition that initially softens when heated and then proceeds to flow and wet out the surface to which it is applied (see page 6, lines 15-21, of the specification). This is consistent with the applicants' objective of using such compositions as sealants, e.g., for automotive roof ditches. In order to prevent gaps that could lead to leaks, the composition must flow when heated to wet the surface being sealed. It is not sufficient that the composition merely soften when heated.

The specification defines a "dimensionally stable film" at page 28, lines 9-22:

Both thermoset and thermoplastic films should

> be dimensionally stable at the temperatures to which they are exposed. By dimensionally stable, it is meant that at [sic] the films have sufficient integrity at the temperatures of use, and particularly, during the heat curing cycle of the melt sealing layer at about 120C to 200C for 20 to 40 minutes, so they do not melt and flow. Also the films do not exhibit wrinkling when they are heated to the melt sealing temperature and subsequently cooled. The films also have enough integrity to prevent entrapped air bubbles in the melt sealing layer from blowing through the film and causing a defect. Preferably, the films, after they have been laminated to a surface, will exhibit a downweb and crossweb shrinkage of less than about 5%, more preferably, less than about 3%, and most preferably, less than about 2%. In highly preferred embodiments, the films will exhibit less than 1% shrinkage in the downweb direction, and less than 0.5% in the crossweb direction.

The purpose of the dimensionally stable film is to control the flow of the melt-flowable composition to ensure that the composition only wets the designated area of the substrate. In some instances, the dimensionally stable film also controls the shrinkage of the composition, preferably confining shrinkage primarily to the downweb direction. For example, in the case of roof ditch moldings, controlling shrinkage in this manner minimizes the formation of drips or balls of sealant in the end of the roof ditch.

The dimensionally stable film also addresses the problem confronting the applicants (as well as their competitors) relating to the condition of the surface that results following application of the sealing composition. Because it has a higher modulus than the underlying melt-flow composition (and thus is stiffer), the dimensionally stable film resists flowing under the elevated

temperatures used to cause the underlying melt-flow composition to flow and wet the substrate. It also retains its surface topography following processing. Thus, for example, if the surface was initially smooth, it remains smooth following processing, thereby facilitating bonding and painting steps. On the other hand, if it bore an embossed design, that design remains substantially unaltered following processing.

The ability of the dimensionally stable film to solve the problems plaguing the use of melt-flowable compositions for applications such as roof ditch molding was surprising. Indeed, the applicants accidentally discovered the utility of the film when they prepared a melt-flowable composition on a stiff, biaxially oriented PET backing and then inadvertently neglected to remove the backing when they melted the composition. Moreover, as one of the inventors, Mr. Johnson, pointed out during an interview with the Examiner, the applicants' primary competitor paid the discovery the ultimate tribute when it copied the use of the dimensionally stable film after its melt-flowable composition failed in side-to-side tests with the applicants' dimensionally stable film-containing products.

VI. Issues

1. Whether claims 6-8, 16, 20-26, and 32 are unpatentable under 35 U.S.C. § 102 as being anticipated by Wagner et al., U.S. 3,837,984 ("Wagner").

2. Whether claims 6-8, 16, 20-26, and 32 would have been obvious in view of Wagner.

3. Whether claims 10-13 would have been obvious over

Wagner in view of Pletcher, U.S. 4,173,506 ("Pletcher").

4. Whether claims 9 and 28 would have been obvious over Wagner in view of Schappert et al., U.S. 4,822,683 ("Schappert").

5. Whether claims 17-19 and 27 would have been obvious over Wagner in view of Kan, U.S. 4,631,233 ("Kan").

6. Whether claims 6-32 are unpatentable under 35 U.S.C. § 112, first paragraph, on the grounds that the specification provides no support for the claim language describing the dimensionally stable film as "having a pre-selected topography".

7. Whether claims 14-15 and 29-31 are unpatentable under 35 U.S.C. § 112, first paragraph, on the basis that claims are only enabled for dimensionally stable films prepared from fully thermoset epoxy-polyester blends.

VII. Grouping of Claims

The rejected claims stand or fall together.

VIII. Argument

The Examiner has rejected the claims as lacking novelty under Section 102 and as being obvious under Section 103. A rejection based upon lack of novelty under 35 U.S.C. § 102 requires that every element in the claim at issue be found in a single reference. Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 771-72 (Fed. Cir. 1983) (patent not anticipated where claimed element not found in prior art).

The test under 35 U.S.C. § 103 is whether the claimed subject matter as a whole would have been obvious over the prior art. The nature of the problem addressed by the inventor and the inventor's solution to the problem are factors to be considered in

determining whether the invention would have been obvious. Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 935 (Fed. Cir. 1990) (where prior art failed to suggest the inventor's solution to the problem, claims held not invalid under Section 103 (other claims held invalid on grounds other than obviousness)); Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1988) (problem confronted by inventor must be considered). Each reference must be considered for all that it teaches. In re Fritch, 972 F.2d 1265 (Fed. Cir. 1992).

Where obviousness involves modification of a reference, or combination of two or more references, some teaching or suggestion in the prior art is required to support modification or combination of the art to arrive at the claimed invention. In re Bell, 991 F.2d 781, 784-85 (Fed. Cir. 1993) (reversing Board's obviousness determination where prior art taught away from combination). Where the proposed modification would render the prior art inoperable for its intended purpose, the prior art in effect teaches away from the claimed invention. In re Gordon, 733 F.2d 900, 902 (Fed. Cir. 1984).

Objective evidence of nonobviousness must also be considered. Such evidence includes evidence that the invention fulfilled a long felt but unresolved need and evidence that others tried to solve the problem confronting the inventor, but failed. In re Dow, 837 F.2d 469, 472 (Fed. Cir. 1988) ("Recognition of need, and difficulties encountered by those skilled in the field, are classical indicia of unobviousness").

When the applicants prepared a melt-flowable composition

on a stiff, biaxially oriented PET backing, placed it on an automobile roof ditch to smooth and seal the surface, and then, by mistake, forgot to remove the backing, they accidentally discovered the surprising advantages of combining a dimensionally stable film with a melt-flowable composition, and solved a problem plaguing both their competitors and them. The applicants' invention is patentable over the cited art (Wagner , Pletcher, Schappert, and Kan) relied on by the Examiner, which nowhere teaches this claimed combination.

Claims 6-8, 16, 20-26, and 32 stand rejected under §102 and, in the alternative, §103 over Wagner. In making these rejections, the Examiner misreads the Wagner reference. Wagner teaches neither a dimensionally stable film nor a melt-flowable composition.

Wagner describes thermosetting adhesive articles featuring a nitrile phenolic adhesive applied to a flexible support sheet. The flexible support sheet may be a polyurethane such as a polyether-based polyurethane or silicon rubber. Wagner describes two uses for these articles. In one embodiment, the article, in the form of a tape, is affixed to the side of an automobile and used to secure molding clips in place. The clips are then used to mount a molding strip onto the side of the automobile. In a second embodiment, the article is used to bond a fastener to a surface. For example, the article is formed in the shape of a ring and used to secure a threaded grommet in a bulkhead.

The articles described in Wagner contain neither a "melt-flowable composition" nor a "dimensionally stable film." The

nitrile phenolic adhesive merely softens when heated--it does not flow and wet out a surface. This is consistent with Wagner's intended uses for the article, neither of which involves melt sealing. Wagner merely requires an adhesive composition that softens when heated so that it can be adhered to a substrate. Indeed, for Wagner's purposes, a melt-flowable composition (as opposed to a heat-softenable material) would be <u>undesirable</u>. For example, in the case of the molding clips held against the vertical automobile side, use of a melt-flowable composition would cause the clips to slide down the side of the automobile.

The particular polyurethane and silicon rubber sheets Wagner describes are not "dimensionally stable films," as that term is defined in the specification. The purpose of the sheet in Wagner's article is to provide a conformable backing that enables the article to be applied in the desired location. Consistent with this objective, Wagner emphasizes that each sheet is flexible (at col. 3, lines 70-73 and col. 4, lines 36-38):

> The tape 10 is formed by a flexible support sheet or layer 12 of polyurethane, preferably a polyether-based thermoplastic polyurethane.
>
> * * *
>
> Silicon rubber support sheet will provide a more flexible thermosetting adhesive tape element for use in bonding together complicated configurations.

Although some types of polyurethane films can qualify as "dimensionally stable" films (see, e.g., applicants' specification at pages 27-28), this is not true of <u>all</u> polyurethane films. The soft polyether-based polyurethanes Wagner describes, for example,

are not dimensionally stable. These flexible films soften when heated and thus could not perform the role that the instant claims require the dimensionally stable film to perform. Indeed, for Wagner's purposes a high modulus, dimensionally stable film would be <u>undesirable</u> because it would limit the ability of the article, prior to heating, to conform to the substrate of interest. For example, a stiff, dimensionally stable film would not be suitable for use as a ring intended to be wedged into an opening for securing a threaded grommet.

Wagner's objectives and the applicants' objectives are completely unrelated. The differences between the Wagner's articles and the applicants' articles, and the fact that neither would be suitable for the other's objectives, reflect this fact. Under these circumstances, the claimed invention is neither anticipated by, nor obvious in view of, Wagner.

Claims 10-13 stand rejected under Section 103 over Wagner combined with Pletcher. Pletcher is cited for teaching other types of dimensionally stable films:. Pletcher's films, however, are not "dimensionally stable."

Pletcher describes tapes in which a thermoplastic polymer may be provided on a variety of backings. The backings are used for transporting the adhesive composition, but are removed prior to use. For example, at col. 9, lines 27-50, Pletcher describes transfer tape embodiments in which the backing transports the tape and is then removed prior to melting the adhesive. Consistent with this objective, the backings Pletcher describes (at col. 9, lines 6-12) are conventional tape backings. They do not qualify as

dimensionally stable films.

For example, Pletcher lists "polyethylene terephthalate" as a suitable backing. However, it is <u>oriented</u> polyethylene terephthalate films which applicants claim. The oriented films, which Pletcher does not describe, have a higher modulus than the unoriented polyethylene terephthalate films typically used as tape backings. Similarly, not all polyolefins and polyurethanes form dimensionally stable films. The soft polyether-based polyurethanes Wagner describes, for example, are not dimensionally stable. Pletcher, therefore, adds nothing to Wagner.

Claims 9 and 28 stand rejected under Section 103 over Wagner combined with Schappert. Schappert describes curable, melt-flowable epoxy-polyester blends. Such blends would be unsuitable for Wagner's purposes because, as discussed above, Wagner requires a composition that merely softens without flowing. Moreover, neither Wagner nor Schappert describes dimensionally stable films; thus, even in combination, Wagner and Schappert fail to yield the claimed invention. Accordingly, the rejection over Wagner combined with Schappert cannot stand.

Claims 17-19 and 27 stand rejected under Section 103 over Wagner combined with Kan. Kan is cited for teaching adhering latex film (e.g., paint) to a polymeric substrate by forming covalent bonds between the film and the substrate. Kan, however, does not address the problem which applicants faced of preventing the formation of cracks and bumps in a painted surface following application and cooling of a melt-flowable composition such as a sealant.

There would be no reason to combine Kan with Wagner. Wagner does not describe tapes designed to present a visible surface. Thus, there would be no motivation for a person of ordinary skill to paint the surface of Wagner's tapes in the first place. Moreover, neither Kan nor Wagner, alone or in combination, teaches melt-flowable compositions combined with a dimensionally stable film. Thus, even in combination, Kan and Wagner would fail to yield the claimed invention. Accordingly, the rejection based upon Wagner combined with Kan cannot stand.

Claims 6-32 were rejected under §112, first paragraph, on the basis of insufficient description for specific claim language. The purpose of the written description requirement is to "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention." Vas-Cath Inc. v. Mahurkar, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). The written description requirement does not require the specification to contain the exact language used in the claims. Thus, for example, in In re Wright, 9 USPQ2d 1649, 1651 (Fed. Cir. 1989), the Court held that the applicant's amended claims, calling for microcapsules "not permanently fixed" to a support, satisfied the written description requirement, even though the specification did not include the "not permanently fixed" language, where the specification as a whole taught the absence of permanently fixed microcapsules. The Court stated (id.):

> As also pointed out in Smith and as admitted by the board, "the claimed subject matter need not be described in haec verba in the specification in order for that specification to satisfy the description requirement." The

> fact, therefore, that the exact words here in question, "not permanently fixed", are not in the specification is not important.

The Court then referred to the examples in the specification which described the importance of not allowing the microcapsules to change position until an image had been formed. Id. The Court stated that the examples implicitly demonstrated that the microcapsules were "not permanently fixed." Id.

Here, the specification likewise adequately describes the invention as now claimed, even though the exact language used in the claims does not necessarily appear in the specification.

With respect to claim language calling for the dimensionally stable film to have a pre-selected topography which is retained following cooling, support is found, for example, at page 7, lines 8-17; page 27, lines 17-19; and page 28, lines 9-22. When read as a whole, as In re Wright requires, these passages demonstrate the applicants' recognition that in certain instances it is desirable to provide an article having a smooth surface (e.g., where the surface is visible or designed to be painted), while in others it is desirable to provide an article having a pre-determined design on its surface (e.g., emblems and insignias). In other words, the applicants recognized that depending upon the intended use of the article, certain surface topographies were desirable. The passages further demonstrate the applicants' appreciation that these topographies could be achieved using a dimensionally stable film. For example, at page 28, lines 9-22, applicants describe properties of the film (ability to resist melting and flowing at the elevated temperatures use for sealing,

resistance to wrinkling, minimal or controlled shrinkage) designed to achieve the objective of a certain surface topography. The specification, therefore, when read as a whole, links the properties of the dimensionally film to the ability to produce an article having certain surface characteristics. Accordingly, the specification satisfies the written description requirement with respect to the language in question.

Claims 14-15 and 29-31 stand rejected under Section 112, first paragraph, on the ground that the claims are only enabled for dimensionally stable films prepared from fully thermoset epoxy-polyester blends. However, the claims refer to a "thermosetting" composition which is described in the specification to include compositions which are not completely set. A "thermosetting" composition is a composition which can undergo crosslinking. Such compositions thus include both materials that are not crosslinked and materials that are partially crosslinked (i.e., "B-staged" materials).

At page 27, lines 20-22, the specification describes "thermoset" epoxy-polyester materials "that have been crosslinked" for use as a dimensionally stable film. The term "thermoset," as used in the art and in the present application, includes materials which are both fully crosslinked and partially crosslinked. Therefore, the applicants teach both fully and partially thermoset material, so long as that material meets the criteria for a dimensionally stable film set forth at page 28, lines 9-22. The term "thermosetting" used in the claims is merely another way of describing the partially thermoset materials. In other words, a

partially crosslinked material can be described either as "thermosetting" or "thermoset."

The specification also teaches thermosetting materials that are uncrosslinked. For example, the specification describes the preparation of a dimensionally stable film as follows (at page 29, lines 23-27; emphasis added):

> Combination films can be formed by conventional means such as adhesively laminating the films together with, for example, a hot melt adhesive or a laminating adhesive, coextruding the films, and extrusion coating the film onto the more stable film <u>and optionally curing the coating</u>.

By stating that the coating is "optionally cured," the specification contemplates thermosetting compositions which are not crosslinked, but are capable of being crosslinked if desired. The claims thus satisfy the requirements of Section 112.

A check for $300.00 is enclosed to cover the fee for this appeal under 37 C.F.R. § 1.17(f). If there are any additional charges, please apply them to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 2/18/97

Dorothy P. Whelan
Reg. No. 33,814

Fish & Richardson P.C., P.A.
60 South Sixth Street, Suite 3300
Minneapolis, MN 55402

Telephone: 612/335-5070
Facsimile: 612/288-9696
7149.M11

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APPENDIX

6. A method for modifying the surface of a substrate comprising the steps of:

(a) placing on said surface an article comprising (i) a melt-flowable composition and (ii) a dimensionally stable film for controlling the melt-flow behavior of said melt-flowable composition, such that said melt-flowable composition contacts said surface,

said film having a pre-selected surface topography;

(b) heating said article to cause said melt-flowable composition to flow over and substantially cover a desired area of said surface to adhere said article to said surface,

said dimensionally stable film controlling the melt-flow behavior of said melt-flowable composition to substantially confine said melt-flowable composition to said desired area of said surface; and

(c) allowing said article to cool while substantially retaining said pre-selected surface topography of said film.

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Judith A Pulleo

Judith A Pulleo.

7. A method according to claim 6 wherein said melt-flowable composition comprises a thermoplastic composition.

8. A method according to claim 6 wherein said melt-flowable composition comprises a thermosetting composition.

9. A method according to claim 6 wherein said melt-flowable composition comprises a semi-crystalline, thermosetting composition comprising an epoxy-polyester blend.

10. A method according to claim 6 wherein said dimensionally stable film comprises an ultra-high molecular weight polyolefin.

11. A method according to claim 6 wherein said dimensionally stable film comprises an ultra-high molecular weight microporous polyolefin.

12. A method according to claim 6 wherein said dimensionally stable film comprises an oriented polyester.

13. A method according to claim 6 wherein said dimensionally stable film comprises oriented polyethylene terephthalate.

14. A method according to claim 6 wherein said dimensionally stable film comprises a B-staged thermosetting composition.

15. A method according to claim 14 wherein said (partially cured) thermosetting composition comprises a B-staged epoxy-polyester blend.

16. A method according to claim 6 wherein said dimensionally stable film comprises a substantially smooth surface (topography.)

17. A method according to claim 6 wherein said dimensionally stable film comprises a substantially smooth, paint-receptive surface,

said method further comprising applying paint to said paint-receptive surface,

said paint-receptive surface remaining substantially smooth following cooling.

18. A method according to claim 17 wherein said substantially smooth, paint-receptive surface comprises a thermosetting epoxy-polyester blend.

19. A method according to claim 17 wherein said substantially smooth, paint-receptive surface comprises an ethylene-vinyl alcohol film.

20. A method according to claim 6 wherein said dimensionally stable film comprises a substantially smooth, bondable surface,

said method further comprising bonding a component to said surface of said film.

21. A method according to claim 6 wherein said dimensionally stable film exhibits a downweb and crossweb shrinkage of less than about 5% during said heating step.

22. A method according to claim 6 wherein said dimensionally stable film exhibits a downweb and crossweb shrinkage of less than about 3% during said heating step.

23. A method according to claim 6 wherein said dimensionally stable film exhibits a downweb and crossweb shrinkage of less than about 2% during said heating step.

24. A method according to claim 6 wherein said dimensionally stable film exhibits a downweb shrinkage of less than about 1% and a crossweb shrinkage of less than about 0.5% during said heating step.

25. A method according to claim 6 comprising placing said article on the surface of a metal joint of a vehicle and heating said article to seal said joint.

26. A method according to claim 6 comprising placing said article on the surface of a roof ditch of a vehicle and heating said article to seal said roof ditch.

27. A method according to claim 26 wherein said dimensionally stable film comprises a substantially smooth, paint-receptive surface,

said method further comprising applying paint to said paint-receptive surface,

said paint-receptive surface remaining substantially smooth following cooling.

28. A method for modifying the surface of a substrate comprising the steps of:

(a) placing on said surface an article comprising (i) a melt-flowable composition comprising a semi-crystalline, thermosetting epoxy-polyester blend and (ii) a dimensionally stable film for controlling the melt-flow behavior of said melt-flowable composition, such that said melt-flowable composition contacts said surface,

said film comprising an oriented polyester film having a substantially smooth surface topography;

(b) heating said article to cause said melt-flowable composition to flow over and substantially cover a desired area of said surface to adhere said article to said surface,

said dimensionally stable film exhibiting a downweb and crossweb shrinkage of less than about 5% and controlling the melt-flow behavior of said melt-flowable composition to substantially confine said melt-flowable composition to said desired area of said surface; and

(c) allowing said article to cool while substantially retaining said substantially smooth surface topography of said film.

29. A method for modifying the surface of a substrate comprising the steps of:

(a) placing on said surface an article comprising (i) a melt-flowable composition and (ii) a dimensionally stable film for controlling the melt-flow behavior of said melt-flowable composition, such that said melt-flowable composition contacts said surface,

said film ~~comprising~~ having a substantially smooth, paint-receptive surface ~~comprising~~ composed of a thermosetting epoxy-polyester blend;

(b) heating said article to cause said melt-flowable composition to flow over and substantially cover a desired area of said surface to adhere said article to said surface,

said dimensionally stable film controlling the melt-flow behavior of said melt-flowable composition to substantially

confine said melt-flowable composition to said desired area of said surface; and

(c) allowing said article to cool while substantially retaining said substantially smooth surface topography of said film.

30. A method according to claim 29 wherein said dimensionally stable film comprises a B-staged epoxy-polyester blend.

31. A method according to claim 29 wherein said dimensionally stable film comprises an oriented polyester film provided on one surface with a thermosetting epoxy-polyester blend.

32. A method according to claim 6 wherein said melt-flowable composition comprises a plurality of melt-flowable layers in which the melt-flow properties of the individual layers are tailored such that said layers cooperate with each other to achieve the desired coverage of said surface.

Respectfully submitted,

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Dorothy P. Whelan
Reg. No. 33,814

Fish & Richardson P.C., P.A.
60 South Sixth Street, Suite 3300
Minneapolis, MN 55402

Telephone: 612/335-5070
Facsimile: 612/288-9696
7153.M11